

What is claimed is:

1. A process for the manufacture of hydrofluorocarbons or hydrochlorofluorocarbons comprising:
  - 5 a) reacting a mixture of at least two three-carbon reactants with an effective amount of chlorine and hydrogen fluoride in a reactor in the vapor phase and in the presence of a fluorination catalyst to form a product which comprises a mixture of 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane and 2-chloro-1,1,1,2,3,3,3-heptafluoropropane; and then
  - 10 b) separating at least one of 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane and/or 2-chloro-1,1,1,2,3,3,3-heptafluoropropane from said mixture.
2. The process of claim 1 wherein 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane is separated from said mixture.
- 15 3. The process of claim 1 wherein 2-chloro-1,1,1,2,3,3,3-heptafluoropropane is separated from said mixture.
4. The process of claim 1 further comprising the subsequent step of:
  - 20 c) reacting said separated 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane and/or 2-chloro-1,1,1,2,3,3,3-heptafluoropropane with hydrogen under conditions sufficient to form a reaction product which comprises 1,1,1,3,3,3-hexafluoropropane, or 1,1,1,2,3,3,3-heptafluoropropane or mixtures thereof.
- 25 5. The process of claim 1 wherein 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane is separated from said mixture, and further comprising reacting said 2,2-dichloro-

1,1,1,3,3,3-hexafluoropropane with hydrogen under conditions sufficient to form a reaction product which comprises 1,1,1,3,3,3-hexafluoropropane.

5 6. The process of claim 1 wherein 2-chloro-1,1,1,2,3,3,3-heptafluoropropane is separated from said mixture, and further comprising reacting said 2-chloro-1,1,1,2,3,3,3-heptafluoropropane with hydrogen under conditions sufficient to form a reaction product which comprises 1,1,1,2,3,3,3-heptafluoropropane.

10 7. The process of claim 1 wherein each of 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane and 2-chloro-1,1,1,2,3,3,3-heptafluoropropane are separated from said mixture, and further comprising reacting each of said separated 2,2-dichloro-1,1,1,3,3,3-hexafluoropropane and 2-chloro-1,1,1,2,3,3,3-heptafluoropropane with hydrogen under conditions sufficient to form 1,1,1,3,3,3-hexafluoropropane and 1,1,1,2,3,3,3-heptafluoropropane.

15 8. The process of claim 1 wherein said three-carbon reactants comprise a material selected from the group consisting of three-carbon hydrocarbons, three-carbon hydrochlorofluorocarbons, three-carbon chlorofluorocarbons and combinations thereof.

20 9. The process of claim 1 wherein said three-carbon reactants comprise a material selected from the group consisting of propane, propene, halogenated propanes, and halogenated propylene.

25 10. The process of claim 4 wherein said reaction with hydrogen is conducted without use of a catalyst.

11. The process of claim 4 wherein said reaction with hydrogen is conducted by using of a hydrogenation catalyst.
12. The process of claim 11 wherein said hydrogenation catalyst comprises  
5 palladium, palladium black, palladium hydroxide, palladium oxides, platinum, platinum oxides, nickel, Raney nickel, ruthenium chloride, ruthenium, rhodium, cobalt, molybdenum, chromium, copper chromite or combinations thereof.
13. The process of claim 11 wherein said hydrogenation catalyst comprises alumina  
10 or activated carbon supported palladium, palladium black, palladium hydroxide, palladium oxides, platinum oxides, nickel, Raney nickel, ruthenium chloride, ruthenium, rhodium, cobalt, molybdenum, chromium, platinum, copper chromite or combinations thereof.
14. The process of claim 1 wherein said fluorination catalyst is selected from the  
15 group consisting of transition metal halides and oxides, Group IVb metal halides and oxides, Group Vb metal halides and oxides and combinations thereof.
15. The process of claim 1 wherein said fluorination catalyst is selected from the  
20 group consisting of  $\text{Cr}_2\text{O}_3$ ,  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$ ,  $\text{Cr}_2\text{O}_3/\text{AlF}_3$ ,  $\text{Cr}_2\text{O}_3/\text{carbon}$ ,  $\text{CoCl}_2/\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$ ,  $\text{NiCl}_2/\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$ ,  $\text{CoCl}_2/\text{AlF}_3$ , and  $\text{NiCl}_2/\text{AlF}_3$ .
16. The process of claim 1 wherein said fluorination catalyst comprises chromium  
(III) oxide.  
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17. The process of claim 1 wherein said hydrogen fluoride is pre-vaporized.

18. The process of claim 1 wherein said reacting is conducted at a temperature of from about 150 °C to about 450 °C.

5 19. The process of claim 1 wherein said reacting is conducted at a pressure of from about 5 psig to about 300 psig.

20. The process of claim 1 wherein said reacting is conducted at atmospheric pressure.

10 21. The process of claim 1 wherein said reaction is conducted with a molar amount of chlorine which ranges from about 3 mole % to about 30 mole % per mole of three-carbon reactant mixture.

15 22. The process of claim 1 wherein the mole ratio of said mixture of three-carbon reactants to hydrogen fluoride is from about 1:2 to about 1:100.

23. The process of claim 1 wherein the mole ratio of said mixture of three-carbon reactants to hydrogen fluoride is from about 1:4 to about 1:80.

20 24. The process of claim 1 wherein the result from step (b) produces a remainder and recycling the remainder by adding it to the mixture of step (a).

25 25. The process of claim 4 wherein said reacting with hydrogen step is carried out at a temperature of from about -20°C to about 700°C.

26. The process of claim 4 wherein said reacting with hydrogen step is carried out for a time of from about 0.1 seconds to about 72 hours.